

**STUDIES ON STONEFLIES (PLECOPTERA) OF COLORADO WITH  
EASTERN FAUNAL AFFINITIES, INCLUDING A NEW STATE RECORD OF  
THE MIDWESTERN SALMONFLY, *PTERONARCYS PICTETII* HAGEN  
(PLECOPTERA: PTERONARCYIDAE)**

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*Abstract.*—*Pteronarcys pictetii* Hagen nymphs were collected and reared from the South Platte River at Julesburg in eastern Colorado. Including *P. pictetii*, eight species are now known from Colorado that exhibit eastern North American affinities, *Paracapnia angulata* Hanson, *Taeniopteryx burksi* Ricker and Ross, *Taeniopteryx parvula* Banks, *Acroneuria abnormis* (Newman), *Perlesta decipiens* (Walsh), *Isoperla bilineata* (Say), and *Isoperla marlynia* (Needham and Claassen). A brief discussion of the dispersal of these species into Colorado is presented.

*Key Words:* Plecoptera, *Pteronarcys pictetii*, Colorado

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Currently, 86 species of stoneflies have been recorded from Colorado (Kondratieff and Baumann 2002). Included in this list are seven species, *Paracapnia angulata* Hanson, *Taeniopteryx burksi* Ricker and Ross, *T. parvula* Banks, *Acroneuria abnormis* (Newman), *Perlesta decipiens* (Walsh), *Isoperla bilineata* (Say), and *I. marlynia* (Needham and Claassen), that primarily have an eastern North American distribution. During a recent survey of the South Platte River in eastern Colorado, four *Pteronarcys pictetii* Hagen nymphs were collected and reared from the South Platte River at Julesburg (Fig. 1). Including *P. pictetii*, eight species, are now known from Colorado that exhibit eastern North American faunal affinities.

Specimens were examined from the holdings of the C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, Colorado (CSUC), U. S. Geological Survey National Water Quality Laboratory, Denver, Colorado (NWQL), and Il-

linois Natural History Survey, Champaign, Illinois (INHS). Additional records were provided by the Monte L. Bean Museum, Brigham Young University, Provo, Utah (BYUC), or were taken from the literature.

*Paracapnia angulata* Hanson 1961

*Paracapnia angulata* is a common species typically associated with eastern North America (Stark and Baumann 2004), but also can be found in the Black Hills of South Dakota and Wyoming (Huntsman et al. 1999). This species also extends into northern Colorado on both sides of the Continental Divide. The Missouri River Corridor supports the eastern dispersal of this species into the North Platte River Basin where it can be abundant (Kondratieff and Baumann 2002), or into the South Platte River Basin. The presence of this species in the upper Colorado River Basin may be the result of a naturally occurring headwater transfer between the upper South

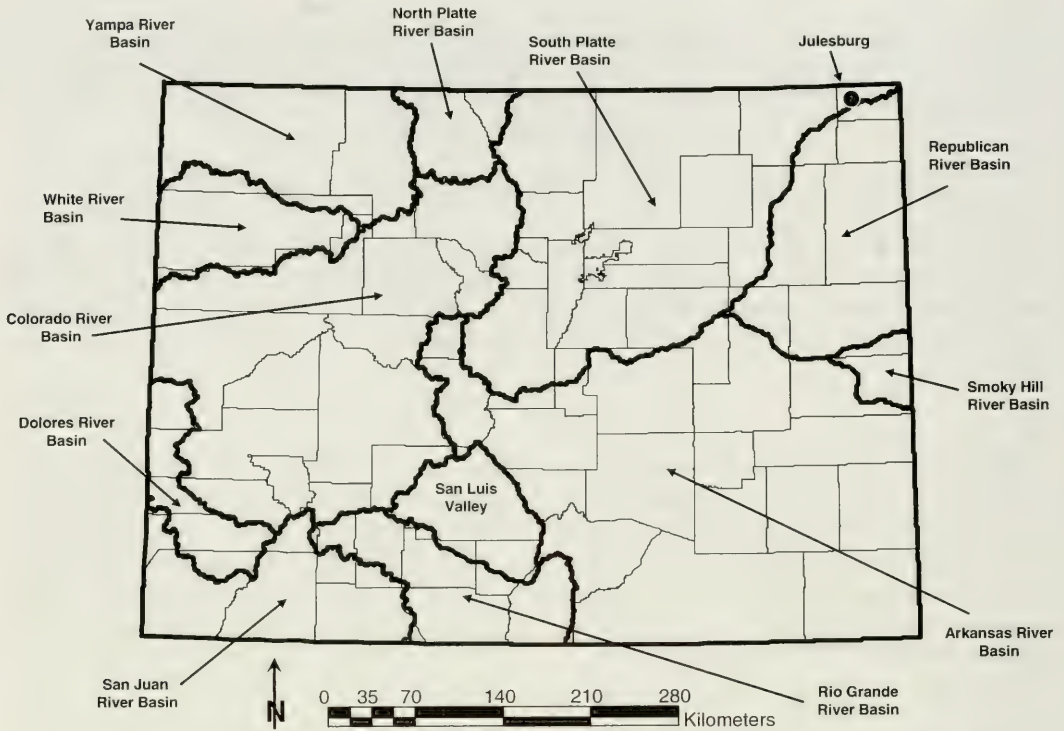


Fig. 1. Map of the state of Colorado and its counties illustrating the 10 major river basins that flow out of the state and the closed basin of the San Luis Valley (basin boundaries defined by bolded lines). Base map credits are as follows: State of Colorado outline from Environmental Systems Research Institute, Inc. Redlands, California, USA, Series issue: 2000; river basin boundaries from U.S. Geological Survey, Reston, Virginia, 1994; stream and rivers from U. S. Geological Survey in cooperation with the U.S. Environmental Protection Agency, Reston Virginia, 1998.

Platte and upper Colorado River basins. Behnke (1992) proposed a similar scenario for the dispersal of cutthroat trout between the upper Colorado, upper South Platte, and upper Arkansas River basins. Another possible scenario is the potential for a naturally occurring headwater transfer from the North Platte River Basin via the Sweetwater River into the upper Colorado via the tributaries of the Green River (R.J. Behnke personal communication, 2004). No trout species are native to the North Platte River Basin (Behnke 1992) indicating that if a headwater transfer took place between the North Platte and Green River, conditions were not conducive for the survival of trout (e.g., unsuitable water temperatures or turbidity). *Paracapnia angulata* is found in a variety of stream types (Stark and Baumann

2004), which could have facilitated the dispersal of this species into the upper Colorado Basin via the North Platte Basin even though conditions were not appropriate for trout. The low lying area between the Sweetwater River and the upper Green River also may have provided a flight corridor for dispersing adults even if a water connection did not occur during a natural headwater transfer. Stark and Baumann (2004) provide records of *P. angulata* from the North Platte River supporting the headwater transfer theory.

Material examined.—Colorado, Jackson Co., *Roaring Fork*, CR 5 Bridge, 2,461 m, 31-III-1991, B. C. Kondratieff & R. R. Durfee, 3 ♂, 15 ♀, 4 nymphs, CSUC; *North Platte River*, North Gate Canyon, 21-IV-1993, R. R. Durfee, 1 ♂, 3 ♀, CSUC; Lar-

imer Co., *Dale Creek*, Hwy 287 bridge, 2,059 m, 26-IV-1992, R. R. Durfee, 1 ♀, CSUC; 1-IV-1994, H. A. Rhodes, 1 nymph, CSUC; *Cache la Poudre River*, Lyons Park Overland Trail Rd. NW of Fort Collins, 1,544 m, 20-III-2001, anonymous, 1 ♂, CSUC; Routt Co., *Yampa River*, upstream from the confluence with Service Creek just below Stage Coach Reservoir, 2,138 m, 31-III-1995, T. Schneck, 2 nymphs, CSUC; *Grizzly Creek*, Hwy 14, 16.1 km W of Walden, 2455 m 7-III-1990, B. C. Kondratieff & M. Harris, 1 ♂, 2 nymphs, CSUC. Stark and Baumann (2004) and Baumann et al. (1977) provide additional *P. angulata* records for Colorado.

*Taeniopteryx burksi* Ricker and Ross 1968

*Taeniopteryx burksi* is a widespread species ranging over much of eastern and central North America (Stewart 2000). Previously, Kondratieff and Ward (1987) reported Colorado localities for this species from the North and South forks of the Republican River and Chief Creek. These localities occur in the Great Plains of eastern Colorado. Kondratieff and Baumann (1988) indicated that the presence of *T. burksi* in Colorado is a result of the western dispersal of this species from the east associated with continental glaciation events (Stewart et al. 1974). The Republican River is tributary to the Missouri River via the Kansas River, which probably provided the conduit for westward dispersal into Colorado. During this survey, *T. burksi* was collected and reared from the South Platte River in North Platte, Nebraska. It is likely *T. burksi* will be collected from the northeastern portion of the South Platte River Basin in Colorado (Fig. 1).

Material examined.—Colorado, Yuma Co., *Chief Creek*, CR CC North, 1,111 m, 22-I-1994, B. C. Kondratieff & R. R. Durfee, 23 ♂, 27 ♀, 18 nymphs, CSUC; *North Fork Republican River*, River by Rail Road, 1,026 m, 20-II-1994, H. A. Rhodes & B. C. Kondratieff, 6 ♂, 5 ♀, 8 nymphs, CSUC. Kondratieff and Ward (1987) and Kondra-

tieff and Baumann (1988) provide additional *T. burksi* records for Colorado.

*Taeniopteryx parvula* Banks 1918

*Taeniopteryx parvula* is a species typical of larger streams in eastern North America (Stewart 2000). Canton et al. (1981) first reported unidentified species of *Taeniopteryx* in Colorado from the North Platte Basin. Kondratieff and Baumann (1988) later concluded these populations were *T. parvula*. The presence of *T. parvula* in north central Colorado is probably a result of the western dispersal from the east along the Missouri and Platte River connections. The Colorado records are from the North Platte River Basin supporting this route of dispersal. Kondratieff and Baumann (1988) reported that this species might be more common than records indicate because emergence occurs in some populations when streams may be under ice. Additional sampling is necessary along the North Platte River corridor to determine the distribution of this species in Colorado, Wyoming, and Nebraska.

Material examined.—Colorado, Jackson Co., *North Platte River*, North Gate Canyon, 2,383 m, 21-IV-1993, R. R. Durfee, 24 ♂, 4 ♀, CSUC; *Roaring Fork*, CR 5 Bridge, 2,461 m, 31-III-1991, B. C. Kondratieff & R. R. Durfee, 3 nymphs, CSUC; *Grizzly Creek*, Hwy 14 15.8 km W of Walden, 2,455 m, 7-IV-1990, B. C. Kondratieff & M. Harris, 2 ♀, CSUC; same creek, except 16-XI-1986, B. C. Kondratieff, 5 nymphs, CSUC. Kondratieff and Baumann (1986) provide additional *T. parvula* records for Colorado.

*Acroneuria abnormis* (Newman 1938)

*Acroneuria abnormis* has one of the widest geographical distributions of any stonefly in North America (Stark and Baumann 2005). In the Rocky Mountain states this species has been reported from Colorado, New Mexico, Utah, and Wyoming (Stark and Baumann 2005). In Colorado, this species is found only in the Colorado River and larger tributaries west of the Continen-



tal Divide, and reflects a Missouri River dispersal pattern (Baumann et al. 1977, Baumann and Jacobi 1984). The dispersal of *A. abnormis* to the western slope of Colorado likely follows the same pattern as *P. angulata* through a headwater transfer between the upper Sweetwater River Basin and the upper Green River Basin in Wyoming. *Acroneuria abnormis* is found in the North Platte River and upper Green River in Wyoming (unpublished data on file at CSUC) so it is possible that a natural headwater transfer between these two basins may explain the dispersal of stoneflies with eastern affinities across the Continental Divide into the upper Colorado River system. Even if a natural headwater transfer did not take place, the low lying topographic separation may have facilitated flight dispersal across the Continental Divide.

Material examined.—Colorado, Mesa Co., *Colorado River*, Corn Lake State Wildlife Area, 1,433 m, 2-IX-1990, R.R. Durfee, 1 nymph, CSUC; at Broadway in Grand Junction, 1,385 m, 23-XI-1990, M. Trammell, 1 nymph, CSUC; at Palisade, 1,437 m, 6-IV-1991, B. C. Kondratieff, 1 nymph, CSUC; Hwy 141 at Colorado River State Park, 1,414 m, 20-IX-1998, H. Freeman, 1 nymph, CSUC; same as above except, 2-VI-1988, S. Jones, 1 ♀, CSUC; Moffat Co., *Green River*, Echo Park Dinosaur National Monument, 1,640 m, 19-VIII-1993, B.C. Kondratieff & R.R. Durfee, 3 nymphs, CSUC. Baumann et al. (1977) provides additional records of this species from Colorado including a record from Garfield County.

*Perlesta decipiens* (Walsh 1862)

Herbert H. Ross and J. A. Ross collected the earliest record of *P. decipiens* known from Colorado in 1938 at Longmont (INHS) probably from the Saint Vrain River. Stark (1989) reported this species to be common in the Republican River Drainage in eastern Colorado. This species appears to be quite common in the eastern portion of the South Platte River Basin and has been recently collected near the Plains/Mountain

Interface along the Front Range of Colorado from Ralston Creek in Arvada, CO, and from lights in Fort Collins, CO. Additionally, a population occurs in the North Fork Cache la Poudre River where it drains the foothills of the northern portion of the east slope of the Rocky Mountains in Colorado (Zuellig et al. 2002). In this population, *P. decipiens* co-occurs with typical mountain taxa (Zuellig et al. 2002, Kondratieff and Baumann 2002). This widespread midwestern species probably moved into Colorado from the east via the South Platte River and its downstream tributaries with the Missouri River.

This species also is known from New Mexico (Jacobi et al. 2005). Kondratieff and Baumann (2002) reported on a disjunct population in the Conejos River where it also co-occurs with typical mountain fauna. The occurrence of *P. decipiens* in the Conejos River may be explained by its connection with the Rio Grande Basin as we have records from the Rio Grande River downstream of Colorado (unpublished data on file at CSUC). It is likely that *P. decipiens* will be collected in other river basins of the eastern plains of Colorado such as the Arkansas (Fig. 1).

Material examined.—Colorado, Boulder Co., *Probably at the Saint Vrain River*, Longmont, 1,503 m, 27-VII-1938, H. H. Ross & J. A. Ross, 1 ♀, INHS; Jefferson Co., *Ralston Creek* above Simms at Arvada, 25-VI-2003, 3 nymphs, USGS NWQL, Morgan Co., *South Platte River*, Cottonwood State Wildlife Area N of Brush, 5-VI-2000, B. C. Kondratieff, 25 ♂, 10 ♀, CSUC; Larimer Co., *Shields and Horsetooth in parking lot*, 1,548 m, 28-VIII-2003, J. Owens, 1 ♂, CSUC; *Irrigation Canal*, Wellington Game Lands 3.2 km E of Wellington, 1,586 m, 19-X-1986, R. Keith, 3 nymphs, CSUC; *North Fork Cache la Poudre River*, Phantom Canyon Preserve, 1,627 m, 26-VII-1997, B. C. Kondratieff, 1 nymph, CSUC; *Black light trap*, Cranshaw Home, Fort Collins, 1,524 m, 2-VIII-1987, W. Cranshaw, 1 ♂, 1 ♀, CSUC;

Conejos Co., *Conejos River*, CR 28 at state Stream Gage, 2,286 m, 30-VI-1996, B. C. Kondratieff, 1 ♂, 3 ♀, CSUC; Weld Co., 17.7 km E SE of Roggen, 1,480 m, 26-VII-1995, P. A. Opler, 2 ♂, 1 ♀, CSUC; Yuma Co., *Chief Creek*, CR CC North, 1,111 m, 28-VI-1986, B. C. Kondratieff, 1 ♂, 12 ♀, 5 nymphs, CSUC.

*Isoperla bilineata* (Say) 1823

The validity of *Isoperla bilineata* in Colorado is uncertain, but many scientists agree that it is possible *I. bilineata* once inhabited Colorado (Baumann et al. 1977, Szczytko and Stewart 1978, Ruse and Herrmann 2000, Kondratieff and Baumann 2002). Needham and Claassen (1925) first reported *I. bilineata* from Colorado but did not give locality information. Needham and Claassen deposited much of their material in the entomological collection at Cornell University, Ithaca, New York. The senior author contacted E. Richard Hoebeke, Cornell University, but the specimens of *I. bilineata* reported by Needham and Claassen (1925) were not in the known holdings of the Collection. If this record is valid, it is possible that *I. bilineata* entered Colorado through the Arkansas River or the South Platte River drainage system. It is likely that *I. bilineata* occurred in the South Platte and Arkansas basins before the occurrence of urban development and extensive water management. Rhodes and Kondratieff (1996) did not report *I. bilineata* from the eastern tributaries of the South Platte River in Nebraska. However, adults of this species are known from the Cedar River, North Loup River, Mormon Canal, and the Missouri River in north central Nebraska (Kondratieff and Zuellig unpublished data on file at CSUC). A recent survey of the Arkansas River Basin in Colorado did not find this species (Ruse and Herrmann 2000).

*Isoperla marlynia* (Needham and Claassen) 1925

Kondratieff and Baumann (2002) reported *I. marlynia* as a new state record for Col-

orado from the Republican River Basin. This species also is known from the eastern portion of the South Platte River in Colorado. *Isoperla marlynia* likely colonized eastern Colorado from the east during the post glaciation period via the Missouri River and its tributaries. This species also is known from the neighboring states of Kansas and Nebraska (Stark 2001) where it can be quite common.

Material examined.—Colorado, Sedgewick Co., *South Platte River*, Hwy 385 at Julesburg, 1,070 m, 24-I-2004, reared 20-III-2004, R. E. Zuellig & R. W. Hood, 1 female, CSUC. Kondratieff and Baumann (2002) provided additional records of *I. marlynia* from Yuma County, Colorado.

*Pteronarcys pictetii* Hagen 1873

The genus *Pteronarcys* Newman currently includes eight species that occur in North America (Nelson and Hanson 1971, Stark and Szczytko 1982). Of these eight species, *P. californica* Newport and *P. princeps* Banks are western North American species (Stark 2001); whereas, *P. biloba* Newman, *P. comstocki* Smith, *P. pictetii* Hagen, *P. proteus* Newman, and *P. scotti* Ricker are associated with eastern or central midwestern North American streams (Nelson 2000). The transcontinental species, *P. dorsata* (Say) can be a common species in larger rivers of the East but is also recorded from the Northwest Territories, Alaska, and British Columbia (Nelson 2000).

Our recent survey of the eastern plains portion of the South Platte River included *P. pictetii* for the first time in Colorado. *Pteronarcys pictetii* has been previously reported from the neighboring states of Kansas (Stewart and Huggins 1977) and Nebraska (Rhodes and Kondratieff 1996). The occurrence of this species in northeastern Colorado reflects a Missouri River dispersal pattern.

Material examined.—New State Record, Colorado, Sedgewick Co., *South Platte River*, Hwy 385, at Julesburg, 1070 m, Collected 24-I-2004, reared 9-III-2004, R. E. Zuellig & R. W. Hood, 2 ♂, 2 ♀, CSUC.



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